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MINERALOGY AND PETROGRAPHY.[1]

Mt. Hekla Liparites.—The material of three new liparite streams from the vicinity of Mount Hekla, in Iceland, and that of the one described by Preyer and Zirkel[2], have been examined by Backström.[3] In all the rock consists of phenocrysts of orthoclase and green pyroxene in a more or less glassy hyalopilitic groundmass without peculiar features. One specimen contained small grains of olivine and another accumulations of tridymite. None of the streams originated at Hekla. Their source is not known. A granophyre from the north coast of the Snäffel Peninsula is mentioned by the same author as containing plagioclase grains, surrounded by orthoclase zones, and these in turn by micropegmatitic intergrowths in which the orthoclase is orientated with the same mineral in the zone around the plagioclase. This and other granophyric liparites in the neighborhood are very similar to the 'Krablite' inclusions thrown out from the crater of Viti. Of the other liparites of different ages described by the author some are trachytic in character and others are granophyric. In discussing their general features Backström separates them into true liparites, liparite glasses and granophyres, composed essentially of feldspars, pyroxene, iron oxides, zircon and glass, to which are sometimes added quartz, tridymite, apatite, olivine and occasionally hornblende, biotite, hypersthene and sphene. The rarity of biotite is notable. Of the feldspars plagioclase was found in every specimen examined and sanidine in but few. Nevertheless the percentage of CaO in the rocks is small. Upon comparison of seventeen analyses of fresh specimens of the Icelandic liparites it is found that the amount of sodium in them exceeds that of potassium, and that in this respect the Iceland district differs materially from that of the Great Basin and of Hungary.

Bostonite and Monchiquite from Lake Champlain.—A recent abstract of a paper on the trap dykes of the Lake Champlain Valley by Messrs. Kemp and Marsters[4] is very interesting, as it makes known the existence there of two rare types of dyke rocks, bostonite and monchiquite. The bostonite[5] is usually of a creamy or brownish white color. Its structure is typically trachytic, with a few phenocrysts of orthoclase in a groundmass composed of rods of this mineral and of anorthoclase, and between these little masses of quartz. No dark silicates occur in any of the sections examined. An analysis of the rock gave:

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Reise nach Island. Leipzig, 1862, p. 346.

[3] Geol. Fören. Forh., xiii, 7, p. 639.

[4] Trans. N. Y. Acad. Sci., xi, 1891.

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	Loss	Total.
62.28	19.17	3.39	1.44	tr.	5.93	5.37	2.33=	99.91

The specific gravity is 2.648. In several places dykes were noted in which the bostonite cements angular pieces of other rocks forming an eruptive breccia. The included fragments are sometimes slate and red quartz that show no effects of contact action, and sometimes rounded masses of norite, quartzite and limestone, whose shapes are due largely to absorption by the eruptive. The monchiquites consist chiefly of zonal augite, brown hornblende and biotite crystals, and olivine in a feebly refractive groundmass that may be an altered glass. The augite and hornblende are in two generations and the other minerals in but one. An analysis of one specimen gave:

SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	K_2O	Na_2O	Loss	Total
40.37	17.86	14.45	.38	17.61	1.63	.83	1.29	4.47=	98.89[6]

Besides the two types mentioned there occur also in the region many dykes of diabase and camptonite.

The Serpentine of the East Central Alps.—The serpentine occurrences within a restricted area in the East Central Alps have been examined by Weinshenck[7] with a view to learning something of the origin of the rock. Its irregular masses imbedded in crystalline schists consist of serpentine, talc, etc., that were formed by the alteration of a pyroxenic aggregate. At the contact of the rock with the neighboring schists has been produced a great variety of hornstones, among which may be mentioned garnetiferous and epidotic kinds containing much diopside, vesuvianite, etc. The existence of contact effects around the serpentine and the presence of dykes of the latter rock in the surrounding schists indicate to the author that the mother-rock of the serpentine was an eruptive pyroxenite.

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[5] AMERICAN NATURALIST, 1891, p. 573.

[6] Given as 99.39 in original.

[7] Habilitationsschrift. München, 1891.

Petrographical News.—Several banded inclusions from the tonalite of Mte. Aviole in the Tyrolese Alps have yielded Salomon[8] some interesting observations. In one of the specimens one band is composed chiefly of hornblende so filled with elliptical inclusions of quartz, augite and glass that but a mere skeleton of the hornblendic material binds them together. A second band consists largely of augite. The third is principally an intergrowth of quartz and plagioclase in the form of a mosaic, whose particles are polygonal and straight edged. Specimens of contact rocks near the tonalite contain as accessory components sphene, biotite, quartz and zircon. The author calls attention to the peculiar cellular structure of the minerals he describes and asserts that it is a characteristic structure for substances formed by contact action. Aggregates of minerals exhibiting this 'contact structure' he would call contact-amphibolites, contact-gneisses, etc., in accordance with their composition.——In a note on the use of the gold washer's pan as an instrument for the separation of the heavy constituents of sands and decomposed rocks Derby[9] recounts his results of the examination of some granites and gneisses from the United States. In all the specimens examined there were found zircon grains, and these were especially plenty in granites from Otter Creek, Mt. Desert and the Hurricane Islands, in Maine, and from Ilchester, Md., and in the gneisses of Endfield, N. H., and Pascoag, R. I. Monazite is particularly abundant in the granite of Westerly, R. I., and in the gneiss of Randolph, N. H. Xenotime was found in the gneiss of Wessford, Mass., and allanite, rutile and apatite in most of the rocks mentioned. The author thinks that there is a reasonable probability that zircon and monazite may prove to be guide minerals by which eruptive rocks may be detected, however much they may be disguised by metamorphism. The occurrence of these minerals in the crystalline schists is an indication that these rocks are squeezed eruptives and not changed sedimentaries.——The conglomerate of Hoosac Mt., Mass., is overlain by an albite schist whose origin is ascribed by Wolff[10] largely to the replacement of clastic microline grains by albitic substance, with the attendant production of muscovite. Eight excellent figures in the author's article show the transition of decomposed fragments of feldspar into a fresh particle of albite in which all traces of clastic origin have disappeared. The original microline in the schist is often surrounded by a rim of new microline or of albite with the same orientation as the kernel. Arms from this extend into the nucleus, until finally the new material has entirely replaced the old.——In a few notes on some rocks from the Lake District, England, Hutchings[11] mentions briefly the characteristics of a biotite-quartz-andesite, and describes a series of hyalopilitic andesites, and one rock whose chemical composition is that of trachyte, while its mineral components are those of an andesite. He also briefly alludes to an augite porphyrite and a granular diabase.——Another occurrence of peridotite has been discovered in central New York, this time as a small dyke in a fault fissure near Manheim, seven miles east of Little Falls. The rock as described by Smyth[12] consists of phenocrysts of biotite and olivine in a groundmass of glass, biotite, magnetite, perofskite and a fibrous mineral supposed to be microlitic olivine.——Among the eruptive rocks of Flag-staff Hill, Boulder Co., Col., Palmer[13] has discovered quartz porphyries with phenocrysts of quartz, feldspar and black mica in a decomposed microfelsitic base, showing here and there evidences of flow structure. From its analysis the rock seems to be an andesite rather than a quartz-porphyry.——In a recent bulletin Mr. Diller[14] gives a full account of the cone of the volcano that erupted the quartz-basalt described by him a year or so ago, as well as an excellent discussion of the character of its lava.——A granitite from Farèrolle in the Puy-de-Dôm, France, contains in addition to its essential constituents fluorite, autunite and torbenite.[15]

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[8] Neues. Jahrb. f. Min., etc., B. B. vii, p. 471.

[9] Proc. Rochester Acad. Sci., 1, 1891, p. 198.

[10] Bull. Mus. Comp. Zool., xvi, p. 173.

Quartz.—At Pitourees-en-Lordat, France, are beds of dolomitic limestone interlaminated with thin beds of talc schist and cut by veins of quartz in which Lacroix[16] has found some very remarkable twisted quartz crystals. Some of these are simply bent in one plane; others are now spiral, and each seems to have been affected independently of its neighbors. The force that produced the deformation in the shape of the crystals also strongly modified their internal structure, so that sections parallel to *c* show little areas differently orienated like the grains in a quartzite, while in sections perpendicular to *c* uniaxial particles are intermingled indiscriminately with those that are biaxial. On the contact with the veins fine masses of tremolite have been developed in the limestone.——The quartz crystals of Suttrop, Vlotho and Bramsche in Westphalia, and incidentally crystals from other localities, have been thoroughly studied by Bömer,[17] especially with reference to their etched figures and electrical properties. The Westphalian crystals were treated with hydrofluoric acid, and sections cut from them parallel to oP were subjected to the action of the same reagent. The sections were also examined for circular polarization, and the entire crystals for electrical manifestations. The Vlotho and Bramsch crystals, the former of which occur in druses on marl and the latter implanted in white vein quartz in quartzite, are quite simple, while the Suttrop crystals, found loose in the soil overlying a quartzite composed almost exclusively of quartz crystals, are very complicated in structure. These consist usually of two or more individuals twinned, and often intergrown with others in the parallel position. The forms of the etched figures produced on oP vary widely. They depend upon the strength of acid used and upon the temperature at which the action takes place. With increasing strength of acid the figures suffer a rotation around the vertical axes of the crystals, and in the direction of its polarization, i. e. in right polarizing crystals, the rotation is to the right and in left-handed crystals to the left. Many other interesting results in connection with the etched figures of quartz were obtained by the author and some of them contradict the results of other investigators. With reference to the pyro-electrical properties of the crystals it was found that in small ones the negative and positive areas were irregularly distributed, while in large ones the distribution was more regular. Both large and small crystals act similarly when cooled in ether or in water. In each case the trapezohedral edges are positive.

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[11] Geol. Magazine, 1891, p. 536.

[12] Amer. Jour. Sci., April, 1892, p. 322.

[13] Proc. Col. Sci. Soc., iii, 1889, p. 230, and 1890, p. 351.

[14] Bull. U. S. Geol. Survey, No. 79.

[15] Gonnard, Bull. Soc. Franç. d. Min., xiv, p. 223.

[16] Bull. Soc. Franç. d. Min., xiv, 1892, p. 306.

Mineralogical News.—Among the wonderful pseudomorphs of serpentine from the Tilly Foster Mine, N. Y., Dana mentioned a cubic substance whose predecessor was unknown. Friedel[18] has reexamined this substance, and has found in it a central cone of amorphous serpentine, surrounded by a fibrous envelope of the same mineral. The arrangement of the fibres is so regular that the author concludes that the cubic form is due entirely to it, and that there is no reason for supposing the form to be pseudomorphic.——Excellent specimens of

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[17] Neues Jahrb. f. Min., etc.; B. B., vii, p. 516.

[18] Bull. Soc. Franç. d. Min., xiv. p. 120.

metacinnabarite from New Almaden, Cal., have given Melville[19] an opportunity to measure and to analyze its crystals. The mineral occurs in steep rhombohedral forms attached to quartz crystals, which in turn coat cinnabar crystals, resting in a compact mass of this substance and quartz. The terminations of the crystals are differently modified, the analogue pole containing principally the basal plane and rhombohedra, and the antilogue pole mainly steep scalenohedra. The analysis, made on impure material, gave:

S	Hg	Fe	Co	Zn	Mn	$CaCo_3$	Res.	Org. mat.	Total
13.68	78.01	.61	tr.	.90	.15	.71	4.57	.63	= 99.26

The organic matter was in the form of little black spheres imbedded within the crystals.——If the orthopinacoids of the members of the *heulandite* group be made the orthodome $\frac{1}{2}P\bar{\infty}$, Rinne[20] shows that its members may be regarded as forming an isomorphous group with stilbite, harmotome and phillipsite. The axial ratios of the various minerals come into accord with this view if half of *c* is taken as the unit in the members of the stilbite sub-group. The chemical composition of the different minerals is also similar enough to oppose no objection to the idea, the stilbites being mixtures of $R'' \; Al_2 \; Si_6O_{16} + 6Aq$ and $R_2 \; Al_2 \; Al_2 \; Si_4 \; O_{16} + 6Aq$, and the heulandites $R \; Al_2 \; Si_6 \; O_{16} + 6Aq$ for heulandite proper, and $R \; Al_2 \; Si_6 \; O_{16} + 5\frac{1}{2}Aq$. for epistilbite and brewsterite. The physical properties of all the substances mentioned are quite alike and their optical peculiarities are not different.——The *chloritoid* of a graywacke schist from the Champion Mine, Mich., is similar in many respects to masonite, according to Keller and Lane.[21] It is undoubtedly triclinic with B inclined 20° to the basal cleavage. Its pleochroism is $C =$ yellow, $B =$ blue, $A =$ green. An analysis gave:

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	K_2O	Na_2O	H_2O	Total
24.29	.28	34.00	10.55	20.52	tr.	1.29	.59	.97	.35	6.75	=99.59

Its hardness is 6.5 and density = 3.552.——Streng[22] again attempts to solve the composition of *melanophlogite* and succeeds in showing that the sulphur in its material is not in the form of sulphate but is more prob-

[19] Bull. U. S. Geol. Survey, No. 78, p. 80.

[20] Neues Jahrb. f. Min., etc., 1892, i, p. 12.

[21] Amer. Jour. Sci., Dec., 1891, p. 499.

[22] Neues Jahrb. f. Min., etc., 1891, ii, p. 211.

ably present as SiS_2, combined in some way with SiO_2, in the proportion $SiS_2 + 40\ SiO_2$. G. Friedel,[23] on the other hand, insists upon regarding the sulphur as occurring in the form of sulphate.——The *sigterite* from Sigterö, Norway, described by Rammelsberg[24] a short time ago as a new mineral, is acknowledged by this savant and by Tenne to be a mixture of eleolite and albite.——A greenish-white fibrous *talc* from Madagascar[25] has the composition $SiO_2 = 62.3$; $FeO = 2.6$; $MgO = 29.4$; $H_2O = 5.1$.——On a specimen of *dioptase*[26] in calcite from Central Africa Jannetaz has recognized octahedra of silver. This is the first report of the existence of native silver in that quarter of the globe.——Crystals of *barite* from Smithton and Sedalia, Pittis Co., Mo., consist of colorless portions enclosing yellow or white bands, in the latter of which Luedeking[27] and Wheeler find a large quantity of strontium and a small amount of ammonium sulphate. The composition of the crystals is $Ba\ SO_4 = 87.2$; $Sr_2SO_4 = 10.9$; $Ca\ SO_4 = .2$; $NH_4So_4 = .2$; $H_2O = 2.4$.——In consideration of the importance given by Tschermak to *meionite* in his discussion of the scapolite group Kenngott recalculates the formula of the mineral from new analyses recently published and derives $Ca_7\ Al_{10}\ O_{22}\ Si_{11}\ O_{22}$. He evidently places but little confidence in the Tschermak theory.——By mingling solutions of chromates, tungstates, molybdates, sulphates and selenates and studying the mixed crystals resulting Retgers[28] has shown that their alkaline and other salts are isomorphous, and that consequently when they are found as minerals they should all be placed in one group, which is trimorphous. The tellurates, on the other hand, are not isomorphous with any of the above mentioned compounds.——The walls of cavities of the leucite basalt from the south side of Lake Laach are covered with brilliant little crystals that have been carefully examined by Busz.[29] They are *hematites* on which are implanted *rutile* crystals and little colorless *olivines* with a tabular habit parallel to $\infty P \bar{\infty}$. All are supposed to be products of sublimation.——A. Schmidt[30] records the results of observations on pebbles of *zircon*, *almandine* and epidote from Adelaide, Australia. The zircon has a density of 4.695 and a composition of $ZrO = 67.31$; $SiO_2 = 33.42$. The author also describes cubical and octahedral crystals of pyrite from Porkura, Hungary.——*Enargite* from Cerro Blanco, Atacama, Chile, has a density of 4.51. It contains S = 32.21; As = 18.16; Cu = 47.96; Fe = 1.22; Zn = .57.——The *amber-like* substance[31] occurring in the sands of Cedar Lake, near the mouth of the Saskatchewan River, in Canada, has been found by Harrington[32] to have the following composition: C = 79.96; H = 10.46; O = 9.49; As = .09. Its hardness is 2.5 and density 1.055. From its reaction with solvents the author concludes it to be *retinite.*——Lacroix and Baret[33] find *bertrandite* at Mercerie in the Commune of La-Chapelle-sur-Erdre, France. It occurs in crystals elongated parallel to the base, associated with orthoclase, albite, quartz and apatite, in a granitite.

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[23] Bull. Soc. Fr. d. Min., xiv, p. 74.

[24] AMERICAN NATURALIST, 1890, p. 1189.

[25] Jannetaz, Bull. Soc. Fr. d. Min., xiv, p. 66.

[26] Ib., xiv, p. 67.

[27] Amer. Jour. Sci., Dec., 1891, p. 495.

[28] Neues Jahrb. f. Min., etc., 1892, i, p. 56.

[29] Zeits. f. Kryst., 1891, xix, p. 24.

[30] Ib., 1891, xix, p. 56.

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[31] Neufville, Ib., 1891, p. 75.

[32] Amer. Jour. Sci., Oct., 1891, p. 332.

[33] Bull. Soc. Franç. d. Min., xiv, p. 189.